SE Course: Numerical Methods

http://www.cs.aaue.dk/~yang/course/NMbasis/NM2010.htm
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MM2: Approximate Evaluation of Functions

1 kl.8:15-9:00, Review of MM1 and Some Examples

- What we talked in MM1;
- Example of decimal to binary conversion;
- Example of approximate error analysis

2 kl.9:10-10:40, Exercises for MM1

Question One:

(Exercise 1.2.1, page 7) Express the base of natural logarithms e as a normalized floating-point number, using both chopping and symmetric rounding, for each of the following systems:

- (a) base 10 with 4 significant digits;
- (b) base 10 with 7 significant digits;
- (c) base 2 with 10 significant bits.

Question Two:

(Exercise 1.2.2, page 7) Write down the normalized binary floating-point representations of 1/3, 1/5 and 1/6. Use enough bits in the mantissa to see the recurring patterns.

Question Three:

(Exercise 1.3.3, page 11) How many terms of the series expression

$$cosh(x) = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \cdots = \sum_{k=0}^{\infty} \frac{x^{2k}}{(2k)!}$$

are needed to estimate $cosh(1/2)$ with a truncation error less than 10^{-8}? check your answer by comparing with Matlab built-in cosh function.

Question Four:

(Exercise 1.5.1, page 19) Let $x = 1.3576$, $y = 1.3754$. For a hypothetical four decimal digit machine, write down the representations $\hat{x}$ and $\hat{y}$ of $x,\ y$. Find the relative errors in the stored results of $x + y$, $x - y$,xy, and x/y using

- (a) chopping, and
- (b) symmetric rounding.

3 kl.10:50-11:30, Approximate Evaluation of Functions (Theory part)

- Reading material: Subsection 3.1, 3.2, 3.4 in Textbook.